Space Weather Forecast

Issued on Sunday, 15 May 2022 at 13:02 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts becoming more likely from X-ray flares. Slight chance of Minor geomagnetic storm, mainly day 1.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with an isolated low level Moderate-class flare at 15/0008 UTC, from an active region beyond the northeast limb. The front side remains dominated areally by a large and complex sunspot transiting the southwest quadrant. To its southwest, a visually much-weakened remnant of an active sunspot group showed fading to just a few weak spots. Three other numbered, and two un-numbered regions are located in the eastern hemisphere, three of which are clustered toward the northeast limb. However, the region in the southeast is currently the largest and slightly more complex spot group.

There remain numerous small 'filaments' (arcs of plasma) on the sun. A large 'prominence' (arc of plasma on the edge of the sun) eruption occurred from the southeast around 14/1800UTC, with this event visible in satellite imagery but directed below the plane of the Earth's orbit. This has been modelled with no effect indicated at Earth. No other Earth directed Coronal Mass Ejections (CMEs) have been observed in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind, as measured by ACE and DSCOVR satellites, showed an increase during the evening UTC of 14th, from around 370km/s, to a current levelling out at around 570km/s. This is now thought to be the earlier than anticipated arrival of the coronal hole high speed stream. The magnetic field of the solar wind was often at moderate strength, with a peak on the evening UTC of 14th. A slow, erratic settling was observed thereafter to just slightly moderate strength. The important north-south component showed fluctuating periods of north/south orientation, with the longest period of southward orientation between midnight UTC and 15/0300 UTC. The net effect of these solar wind measures was mostly Quiet to Unsettled (Kp 1 to 3) conditions, but with Active (Kp 4) periods observed between 15/0000-0600 UTC by NOAA SWPC and Potsdam.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity should be Low to Moderate, with Moderate-class flares becoming more likely, and a slight chance of a Strong-class flare. The flare risk may trend a little higher through the period owing to potentially further active regions rotating around the northeast limb.
Solar Wind / Geomagnetic Activity: No CMEs currently feature in the forecast.

The current elevated solar winds now appear to indicate the earlier than anticipated arrival of the high speed stream from positive polarity coronal hole 81, bringing forward a Slight Chance of Minor Geomagnetic Storm G1, with the main chance now thought to be on day 1 before

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decreasing through the period. This was the only expected enhancement of the solar wind due in the four day period, and an increasingly Quiet outlook is therefore expected as the forecast period progresses.

Energetic Particles / Solar Radiation: Solar radiation storms are unlikely in the period, although there is slight risk of an S1 or greater event, mainly due to the westward advance of the largest and most complex sunspot region currently on the Earth facing disc.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	10	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	60	60	60
Very Active	R3 to R5 X	No	5	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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